Drinking Water Surveillance Program

ALVINSTON WATER TREATMENT PLANT

Annual Report 1987

Environment Ontario
Jim Bradley, Minister

91-02664/

ISSN 0839-8992

ALVINSTON
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1987

ONTARIO MINISTRY OF ENVIRONMENT
OCTOBER 1988

c Queen's Printer for Ontario, 1988

ACKNOWLEDGEMENTS

The Drinking Water Surveillance Program (DWSP) employs a team approach requiring the co-operative effort of the Ministry of the Environment (MOE) staff from Water Resources and Laboratory Services Branch and the Regions, as well as plant operational staff from the Municipalities.

This annual report was produced by the DWSP Group (Ron Hunsinger, Peter Bohm, Carol Sackville-Duyvelshoff, Chris Fung and John McGrachan) and by Pat Lachmaniuk (on developmental assignment to the Drinking Water Section). Helpful input and reviews were received from Drinking Water Section Staff, in addition to reviews by other MOE and municipal personnel.

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

ALVINSTON WATER TREATMENT PLANT 1987 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored.

The Alvinston Water Treatment Plant is a conventional treatment plant which treats water from the Sydenham River. The treatment process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. This plant serves a population of approximately 800 people and has a design capacity of 0.775 x 1000m3/day.

Raw and Treated water samples were taken in June and were analyzed for approximately 160 parameters. Parameters were divided into the following groups Bacteriological, Inorganic and Physical(Laboratory Chemistry, Field Chemistry and Metals) and Organics (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles).

A summary of results is shown in Table 1.

Due to the sampling frequency, the DWSP is not designed to evaluate all aspects of the bacteriological quality of water, however routine bacteriological monitoring as recommended in the Ontario Drinking Water Objectives (ODWOs) is carried out by the operating authority.

The treated water sample contained Coliform bacteria above the ODWO. The District Officer was notified.

The treated water sample contained a Laboratory Turbidity above the ODWO. The District Officer was notified. All other Inorganic and Physical parameters (Laboratory Chemistry, Field Chemistry and Metals) were below applicable health related ODWOs.

Of approximately 110 Organic parameters tested for, none exceeded any health related guidelines.

Many of the substances detected are naturally occurring or treatment by-products.

For 1987 the DWSP sampling results indicated that the Alvinston Treatment Plant produced water of good quality.

SOMMAIRE

PROGRAMME DE SURVEILLANCE DE L'EAU POTABLE

STATION D'ÉPURATION DE L'EAU D'ALVINSTON
RAPPORT ANNUEL 1987

Le Programme de surveillance de l'eau potable (PSEP) de l'Ontario fournit des informations immédiates, fiables et à jour sur la qualité de l'eau potable. Le PSEP a débuté officiellement en avril 1986. Il est destiné à englober tous les réseaux municipaux d'alimentation en eau de l'Ontario. Actuellement, 44 stations en font partie.

La station d'épuration d'Alvinston est une station classique qui traite l'eau de la rivière Sydenham. Le traitement comporte la coagulation, la floculation, la clarification (clarificateur à débit ascendant), la filtration et la désinfection. Cette station dessert une population d'environ 800 habitants et a une capacité nominale de 0,775 x 1 000 m3/jour.

Des prélèvements d'eau brute et d'eau traitée ont été effectués en juin et analysés par rapport à environ 160 paramètres dans les catégories suivantes : bactériologique, inorganique et physique (analyses en laboratoire et sur place, présence de métaux) et organique (composés aromatiques chlorés, chlorophénols, pesticides et BPC, dérivés phénoliques, hydrocarbures aromatiques polynucléaires, pesticides particuliers et composés volatils).

Le tableau 1 résume les résultats obtenus.

En raison de la fréquence des prélèvements, le PSEP ne permet pas d'évaluer tous les aspects de la qualité bactériologique de l'eau. Cependant, comme on le recommande dans le cadre des objectifs relatifs à la qualité de l'eau potable en Ontario, un contrôle bactériologique est effectué par l'exploitant.

L'échantillon d'eau traitée contenait des coliformes dans une proportion supérieure à celle que recommandent les objectifs provinciaux. De même pour la turbidité mesurée en laboratoire. L'agent de district en a été avisé. Les mesures des autres paramètres inorganiques et physiques étaient inférieures aux limites applicables fixées par l'Ontario pour l'eau potable.

Pour environ 110 paramètres organiques mesurés, aucun résultat n'a dépassé les limites acceptables fixées pour la santé.

Un grand nombre de substances détectées apparaissent naturellement ou sont des produits dérivés de l'épuration.

Les résultats des analyses effectuées en 1987 dans le cadre du PSEP ont indiqué que la station d'épuration d'Alvinston donnait une eau de bonne qualité.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE BY SCAN (1987)

SCAN	RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE
BACTERIOLOGICAL	4	4	100	9	5	55
CHEMISTRY (FLD)	2	2	100	4	4	100
CHEMISTRY (LAB)	19	18	94	19	15	78
METALS	20	14	70	20	11	55
CHLOROAROMATICS	13	0	0	13	0	0
CHLOROPHENOLS	6	0	0	6	0	0
PESTICIDES & PCB	25	0	0	25	0	0
PHENOLICS	1	0	0	1	0	0
SPECIFIC PESTICIDES	35	1	2	36	1	2
VOLATILES	28	0	0	28	4	14
TOTAL	153	39		161	40	

COLIFORMS WERE PRESENT IN ONE TREATED WATER SAMPLE, THE ODWO FOR TURBIDITY WAS EXCEEDED IN ONE SAMPLE

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

ALVINSTON WATER TREATMENT PLANT
1987 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at the Alvinston Water Treatment Plant in the summer of 1985. An annual report was published for 1986 (ISBN 0-7729-2548-8).

This report contains information and results for 1987.

PLANT DESCRIPTION

The Alvinston Water Treatment Plant is a conventional treatment plant which treats water from the Sydenham River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection; activated carbon adsorption is used on seasonal basis. The Alvinston plant serves a population of approximately 800 people. The treatment plant

has a design capacity of 0.775 x 1000m3/day and daily flows ranging from 0.001 x 1000m3/day to 0.796 x 1000m3/day.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from two DWSP approved locations;

i) Raw - The water originated from the lowlift discharge and was sampled through a copper sample line. The sample tap is located in the plant laboratory.

ii) Treated - The water originated from the highlift discharge after addition of all treatment chemicals and was sampled through a copper sample line. The sample tap is located near the clearwell.

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

SITE LOCATION MAP

LOCATION: ALVINSTON WATER TREATMENT PLANT

FIGURE 2

ALVINSTON WATER TREATMENT PLANT

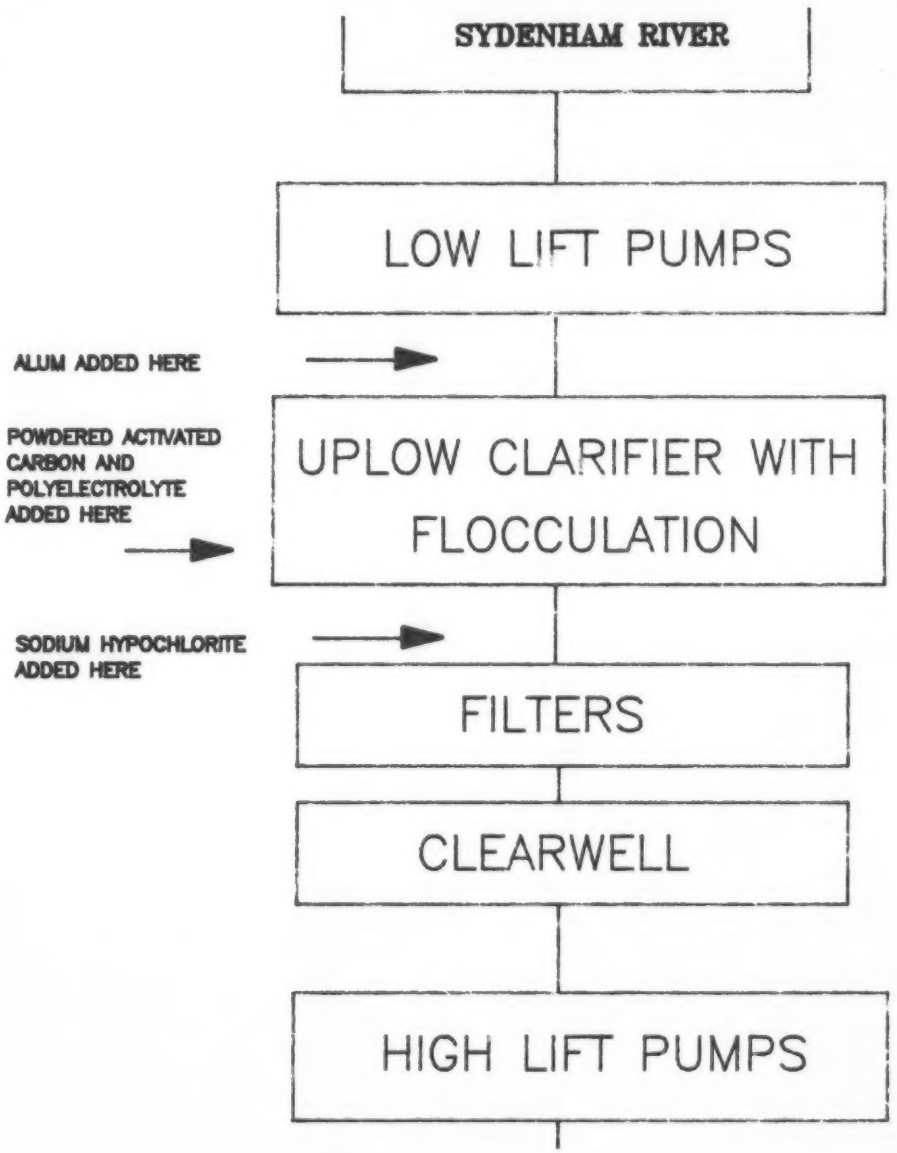

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

ALVINSTON WATER TREATMENT PLANT

LOCATION:	P. O. BOX 29 ALVINSTON, ONTARIO N0N 1A0 (519-898-2047)
SOURCE:	RAW WATER SOURCE - SYDENHAM RIVER
DESIGN CAPACITY:	0.775 (1000 M3/DAY)
OPERATION:	MINISTRY OF ENVIRONMENT
PLANT SUPERINTENDENT:	T. WRIGHT
MINISTRY REGION:	SOUTHWESTERN
DISTRICT OFFICER:	M. LOOBY

MUNICIPALITY SERVED	POPULATION
TOWN OF ALVINSTON	800

example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling.

Stringent DWSP sampling protocols were followed to eliminate any variance (Appendix B).

Sample day flow, treatment chemical dosages and field measurements such as Turbidity, Chlorine Residuals, pH and Temperature were recorded on the day of sampling and were entered onto the DWSP data base as submitted.

RESULTS

The Alvinston Water Treatment Plant, raw and treated water, was sampled for approximately 160 parameters in June of 1987. No samples were submitted by the plant for November even though the bottles were supplied.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 presents parameters not detected.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently initiated by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies

throughout the world.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. **DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.**

Bacteriology

Positive results for the Bacteriology scan were present five times in the treated water. The presence/absence (P.A.) test determined Coliform bacteria to be present within 48 hours in the June treated water sample. Total coliforms, as determined by the membrane filtration method, were detected at 22 counts per 100 mL; this is above the ODWO and indicates unsafe water. The District Officer was notified.

Standard Plate Count is a test used to supplement routine analysis for Coliform bacteria. The limit for Standard Plate Count (35 ^{o}C, 48 hours) in the ODWO is 500 organisms per mL (based on a geometric mean of 5 or more samples). A high Standard Plate Count was present in the June sample. The total chlorine residual for this sample was 0.200 mg/L while the

temperature was 26 °C. The elevated temperature in the raw and treated waters created conditions that were favourable for increased bacteriological activity.

Due to the sampling frequency, the bacteriological quality of water could not be assessed. Routine bacteriological monitoring as recommended in the ODWOs is carried out by the operating authority.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The treated water sample contained a Laboratory Turbidity value of 1.46 Formazin Turbidity Unit (FTU), above the ODWO of 1 FTU. The District Officer was notified. The Field Turbidity determined on this sample was 0.130 FTU. The discrepancies between the Laboratory and Field Turbidity determination, indicated at this plant and numerous other DWSP locations are being investigated. All other results for the Laboratory Chemistry and Field Chemistry scans were below any applicable health related ODWOs.

It is desirable that the Temperature of drinking water be less than 15 °C; the palatability of water is enhanced by its coolness. A temperature below 15 °C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The desired ODWO was exceeded in the treated water.

Metals

The results reported for the Metals scan were below any applicable health related ODWOs.

Iron, Aluminum and Uranium levels were lower in the treated water as compared to the raw water. This is a result of the treatment process. The addition of Alum as a coagulant to the raw water and the resulting coagulation/settling process has been shown to reduce the levels of most metals.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that no Chloroaromatics were detected.

Chlorophenols

The results of the Chlorophenols scan showed that no Chlorophenols were detected.

Pesticides and PCB (Polychlorinated Biphenyl)

The results of the Pesticides and PCB scan showed that no Pesticides and PCB were detected.

Specific Pesticides

Results of the Specific Pesticides scan showed that two pesticides were detected:

Atrazine

Metolachlor

A positive value for Atrazine was detected in both the raw and treated water at 1720 ng/L and 1700 ng/L, respectively. This is below the Health and Welfare Canada Interim Maximum Contaminant Level in Drinking Water of 60000 ng/L for Atrazine.

Metolachlor was detected at trace levels, in both the raw and treated water.

Activated Carbon, a recommended treatment for the removal of pesticides from drinking water was not being added at the time of sampling.

Phenolics

Phenolics were detected, at trace levels, in the raw and treated water. Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes.

Polynuclear Aromatic Hydrocarbons (PAH)

The results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that only one parameter other than Trihalomethanes(THMs), was detected:

Para and Meta-Xylene

Para and Meta-Xylene are measured as one compound, M-Xylene and were detected at a trace level in the treated water.

THMs are acknowledged to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurrs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and Total THMs were detected in the treated water . All THM occurrences were well below the ODWO of 350 ug/l for Total THMs and were lower than those recorded for the same month in 1986.

CONCLUSIONS

It is acknowledged that these conclusions are based on one set of samples only, however the one microbiological sample indicated unsafe water quality. Further, the Total Chlorine Residual in the treated water was only 0.2 mg/L. The low chlorine dosage may also be reflected in the decreased level of Total THMs. A Total Chlorine Residual of at least 0.5 mg/L after at least 15 minutes

contact time after the filter should be applied to most surface water supplies.

The Alvinston Water Treatment plant for the sample year of 1987 produced a water in which no health related guidelines for organic or inorganic parameters were exceeded.

RECOMMENDATIONS

Four recommendations can be made:

1) The data base should be reviewed in consultation with Regional, Plant and DWSP personnel to determine if sampling location, sampling frequency and the number of parameters analysed could be revised to allow for a more efficient characterization of the water.

2) Adequate dosages of activated carbon should be added at times when pesticide contamination of the raw water would be expected.

3) Disinfection procedures should be reviewed to ensure adequate additions of chlorine are maintained especially during the summer when elevated water temperatures would be expected.

4) Sampling of the supply should be undertaken as recommended in order to properly characterize the water.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

	SAMPLE DAY CONDITIONS		TREATMENT CHEMICAL DOSAGES (MG/L)		
			COAGULATION	COAGULATION AID	POST-CHLORINATION
			ALUM LIQUID	POLYELECTROLYTE	SODIUM HYPOCHLORITE
DATE	RETENTION TIME(HRS)	FLOW (1000 M3)			
JUN 15	17.0	.4	40.00	.10	4.00

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE
BACTERIOLOGICAL	AEROMONAS SP	.	.	.	1	0	0
	COLIFORM	.	.	.	1	1	0
	E. COLI (P/A)	.	.	.	1	0	0
	FECAL COLIFORM	.	.	.	1	0	0
	FECAL COLIFORM MF	1	1	0	.	.	.
	P/A BOTTLE	.	.	.	1	1	0
	STANDRD PLATE CNT MF	1	1	0	1	1	0
	STAPH AUREUS	.	.	.	1	0	0
	T COLIFORM BCKGRD MF	1	1	0	1	1	0
	TOTAL COLIFORM MF	1	1	0	1	1	0
*TOTAL SCAN BACTERIOLOGICAL		4	4	0	9	5	0
*TOTAL GROUP BACTERIOLOGICAL		4	4	0	9	5	0
CHEMISTRY (FLD)	FLD CHLORINE (COMB)	.	.	.	1	1	0
	FLD TURBIDITY	1	1	0	1	1	0
	TEMPERATURE	1	1	0	1	1	0
	TOTAL CHLORINE	.	.	.	1	1	0
*TOTAL SCAN CHEMISTRY (FLD)		2	2	0	4	4	0
CHEMISTRY (LAB)	ALKALINITY	1	1	0	1	1	0
	AMMONIUM TOTAL	1	1	0	1	1	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHEMISTRY (LAB)	CALCIUM	1	1	0	1	1	0
	CHLORIDE	1	1	0	1	1	0
	COLOUR	1	1	0	1	1	0
	CONDUCTIVITY	1	1	0	1	1	0
	CYANIDE	1	0	0	1	0	0
	FLUORIDE	1	1	0	1	1	0
	HARDNESS	1	1	0	1	1	0
	MAGNESIUM	1	1	0	1	1	0
	NITRITE	1	1	0	1	0	1
	NITROGEN TOT KJELD	1	1	0	1	1	0
	PH	1	1	0	1	1	0
	PHOSPHORUS FIL REACT	1	1	0	1	0	1
	PHOSPHORUS TTL-UNFIL	1	1	0	1	0	1
	RESIDUE (TOTAL)	1	1	0	1	1	0
	SODIUM	1	1	0	1	1	0
	TOTAL NITRATES	1	1	0	1	1	0
	TURBIDITY	1	1	0	1	1	0
*TOTAL SCAN CHEMISTRY (LAB)		19	18	0	19	15	3
METALS	ALUMINUM	1	1	0	1	1	0
	ARSENIC	1	0	0	1	0	0
	BARIUM	1	1	0	1	1	0
	BERYLLIUM	1	0	0	1	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS	BORON	1	1	0	1	1	0
	CADMIUM	1	0	0	1	0	0
	CHROMIUM	1	1	0	1	0	0
	COBALT	1	0	0	1	0	0
	COPPER	1	1	0	1	1	0
	IRON	1	1	0	1	1	0
	LEAD	1	1	0	1	0	0
	MANGANESE	1	1	0	1	1	0
	MERCURY	1	1	0	1	1	0
	MOLYBDENUM	1	0	0	1	0	0
	NICKEL	1	1	0	1	0	0
	SELENIUM	1	0	0	1	0	0
	STRONTIUM	1	1	0	1	1	0
	URANIUM	1	1	0	1	1	0
	VANADIUM	1	1	0	1	1	0
	ZINC	1	1	0	1	1	0
*TOTAL SCAN METALS		20	14	0	20	11	0
*TOTAL GROUP INORGANIC & PHYSICAL		41	34	0	43	30	3
CHLOROAROMATICS	123 TRICHLOROBENZENE	1	0	0	1	0	0
	1234 T-CHLOROBENZENE	1	0	0	1	0	0
	1235 T-CHLOROBENZENE	1	0	0	1	0	0
	124 TRICHLOROBENZENE	1	0	0	1	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROAROMATICS	1245 T-CHLOROBENZENE	1	0	0	1	0	0
	135 TRICHLOROBENZENE	1	0	0	1	0	0
	236 TRICHLOROTOLUENE	1	0	0	1	0	0
	245 TRICHLOROTOLUENE	1	0	0	1	0	0
	26A TRICHLOROTOLUENE	1	0	0	1	0	0
	HEXACHLOROBUTADIENE	1	0	0	1	0	0
	HEXACHLOROETHANE	1	0	0	1	0	0
	OCTACHLOROSTYRENE	1	0	0	1	0	0
	PENTACHLOROBENZENE	1	0	0	1	0	0
*TOTAL SCAN CHLOROAROMATICS		13	0	0	13	0	0
CHLOROPHENOLS	234 TRICHLOROPHENOL	1	0	0	1	0	0
	2345 T-CHLOROPHENOL	1	0	0	1	0	0
	2356 T-CHLOROPHENOL	1	0	0	1	0	0
	245-TRICHLOROPHENOL	1	0	0	1	0	0
	246-TRICHLOROPHENOL	1	0	0	1	0	0
	PENTACHLOROPHENOL	1	0	0	1	0	0
*TOTAL SCAN CHLOROPHENOLS		6	0	0	6	0	0
PESTICIDES & PCB	ALACHLOR	1	0	0	1	0	0
	ALDRIN	1	0	0	1	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PESTICIDES & PCB	ALPHA BHC	1	0	0	1	0	0
	ALPHA CHLORDANE	1	0	0	1	0	0
	ATRATONE	1	0	0	1	0	0
	BETA BHC	1	0	0	1	0	0
	DIELDRIN	1	0	0	1	0	0
	ENDRIN	1	0	0	1	0	0
	ETHYLENE DIBROMIDE	1	0	0	1	0	0
	GAMMA CHLORDANE	1	0	0	1	0	0
	HCB	1	0	0	1	0	0
	HEPTACHLOR	1	0	0	1	0	0
	HEPTACHLOR EPOXIDE	1	0	0	1	0	0
	LINDANE	1	0	0	1	0	0
	METHOXYCHLOR	1	0	0	1	0	0
	MIREX	1	0	0	1	0	0
	OPDDT	1	0	0	1	0	0
	OXYCHLORDANE	1	0	0	1	0	0
	PCB	1	0	0	1	0	0
	PP-DDD	1	0	0	1	0	0
	PPDDE	1	0	0	1	0	0
	PPDDT	1	0	0	1	0	0
	THIODAN I	1	0	0	1	0	0
	THIODAN II	1	0	0	1	0	0
	THIODAN SULPHATE	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB		25	0	0	25	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PHENOLICS	PHENOL	1	0	1	1	0	1
*TOTAL SCAN PHENOLICS		1	0	1	1	0	1
SPECIFIC PESTICIDES	2,4,5-T	1	0	0	1	0	0
	2,4-D	1	0	0	1	0	0
	2,4-DP	1	0	0	1	0	0
	24DCHLRPHENOXYBUTYRC	1	0	0	1	0	0
	AMETRYNE	1	0	0	1	0	0
	AMINOCARB	0	0	0	0	0	0
	ATRAZINE	1	1	0	1	1	0
	BENOMYL	0	0	0	0	0	0
	BLADEX	1	0	0	1	0	0
	BUX	1	0	0	1	0	0
	CARBOFURAN	1	0	0	1	0	0
	CIPC	1	0	0	1	0	0
	DIALLATE	1	0	0	1	0	0
	DIAZINON	1	0	0	1	0	0
	DICAMBA	1	0	0	1	0	0
	DICHLOROVOS	1	0	0	1	0	0
	DURSBAN	1	0	0	1	0	0
	EPTAM	1	0	0	1	0	0
	ETHION	1	0	0	1	0	0
	GUTHION	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE
SPECIFIC PESTICIDES	IPC	1	0	0	1	0	0
	MALATHION	1	0	0	1	0	0
	METHYL PARATHION	1	0	0	1	0	0
	METHYLTRITHION	1	0	0	1	0	0
	METOLACHLOR	1	0	1	1	0	1
	MEVINPHOS	1	0	0	1	0	0
	PARATHION	1	0	0	1	0	0
	PHORATE	1	0	0	1	0	0
	PICHLORAM	0	0	0	0	0	0
	PROMETONE	1	0	0	1	0	0
	PROMETRYNE	1	0	0	1	0	0
	PROPAZINE	1	0	0	1	0	0
	PROPOXUR	1	0	0	1	0	0
	RELDAN	1	0	0	1	0	0
	RONNEL	1	0	0	1	0	0
	SENCOR	1	0	0	1	0	0
	SEVIN	0	0	0	1	0	0
	SILVEX	1	0	0	1	0	0
	SIMAZINE	1	0	0	1	0	0
	SUTAN	1	0	0	1	0	0
	TOXAPHENE	0	0	0	0	0	0
*TOTAL SCAN SPECIFIC PESTICIDES		35	1	1	36	1	1
VOLATILES	1,1 DICHLOROETHANE	1	0	0	1	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES	1,1 DICHLOROETHYLENE	1	0	0	1	0	0
	1,2 DICHLOROBENZENE	1	0	0	1	0	0
	1,2 DICHLOROETHANE	1	0	0	1	0	0
	1,2 DICHLOROPROPANE	1	0	0	1	0	0
	1,3 DICHLOROBENZENE	1	0	0	1	0	0
	1,4 DICHLOROBENZENE	1	0	0	1	0	0
	111, TRICHLOROETHANE	1	0	0	1	0	0
	112 TRICHLOROETHANE	1	0	0	1	0	0
	1122 T-CHLOROETHANE	1	0	0	1	0	0
	BENZENE	1	0	0	1	0	0
	BROMOFORM	1	0	0	1	0	0
	CARBON TETRACHLORIDE	1	0	0	1	0	0
	CHLOROBENZENE	1	0	0	1	0	0
	CHLORODIBROMOMETHANE	1	0	0	1	1	0
	CHLOROFORM	1	0	0	1	1	0
	DICHLOROBROMOMETHANE	1	0	0	1	1	0
	DICHLOROMETHANE	1	0	0	1	0	0
	ETHYLBENZENE	1	0	0	1	0	0
	M-XYLENE	1	0	0	1	0	1
	O-XYLENE	1	0	0	1	0	0
	P-XYLENE	1	0	0	1	0	0
	T-CHLOROETHYLENE	1	0	0	1	0	0
	T1,2DICHLOROETHYLENE	1	0	0	1	0	0
	TOLUENE	1	0	0	1	0	0
	TOTL TRIHALOMETHANES	1	0	0	1	1	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW			TREATED		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES.	TRICHLOROETHYLENE	1	0	0	1	0	0
	TRIFLUOROCHLOROTOLUE	1	0	0	1	0	0
*TOTAL SCAN VOLATILES		28	0	0	28	4	1
*TOTAL GROUP ORGANIC		108	1	2	109	5	3
TOTAL		153	39	2	161	40	6

KEY TO TABLES 5 AND 6

A ONTARIO DRINKING WATER OBJECTIVES
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
1*. MAC for Bacteriological Analyses
Poor water quality is indicated when :
- total coliform counts > 0 < 5
- P/A Bottle Test is present after 48 hours
- Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
- Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
- Standard Plate Count should not exceed 500 organisms per ml at 35 deg C within 48 hours

2. Interim Maximum Acceptable Concentration (IMAC)
3. Maximum Desirable Concentration (MDC)
4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness >200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.

B HEALTH & WELFARE CANADA
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC

C WORLD HEALTH ORGANIZATION
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

H USSR MAXIMUM PERMISSIBLE CONCENTRATION

I NEW YORK STATE AMBIENT WATER GUIDELINE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
BACTERIOLOGICAL				
AEROMONAS SP (0=ABSENT)		DET'N LIMIT = N/A	GUIDELINE = 0	(A1)
JUN	.	0		
E. COLI (P/A) (0=ABSENT)		DET'N LIMIT = N/A	GUIDELINE =	
JUN	.	0		
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 0	(A1)
JUN	72	.		
FECAL COLIFORM (0=ABSENT)		DET'N LIMIT = N/A	GUIDELINE = 0	(A1)
JUN	.	0		
STANDRD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0	GUIDELINE = 500/ML	(A1)
JUN	2400 >	2100		
P/A BOTTLE (0=ABSENT)		DET'N LIMIT = 0	GUIDELINE = 0	(A1*)
JUN	.	1		
STAPH AUREUS (0=ABSENT)		DET'N LIMIT = N/A	GUIDELINE = 0	(A1)
JUN	.	0		
COLIFORM (0=ABSENT)		DET'N LIMIT = N/A	GUIDELINE = 0 (A1)	
JUN	.	1		
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 5/100ML	(A1)
JUN	200 A3C	22 A3C		
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A	
JUN	66000	2400 >		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = N/A	GUIDELINE =	N/A
JUN	.	.200		
TOTAL CHLORINE (MG/L)		DET'N LIMIT = N/A	GUIDELINE =	N/A
JUN	.	.200		
TEMPERATURE (DEG.C)		DET'N LIMIT = N/A	GUIDELINE =	N/A
JUN	25.000	26.000		
FLD TURBIDITY (FTU)		DET'N LIMIT = N/A	GUIDELINE = 1.0	(A1)
JUN	66.000	.130		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM
	RAW	TREATED		
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = .200	GUIDELINE = 30-500 (A4)
JUN	218.800	139.600	RRV	
CALCIUM (MG/L)			DET'N LIMIT = .100	GUIDELINE = 100. (F2)
JUN	84.800	88.600		
CHLORIDE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 250.0 (A3)
JUN	20.000	22.000		
COLOUR (TCU)			DET'N LIMIT = .5	GUIDELINE = 5.0 (A3)
JUN	11.000	3.000		
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1	GUIDELINE = 400. (F2)
JUN	558	607		
FLUORIDE (MG/L)			DET'N LIMIT = .01	GUIDELINE = 2.400 (A1)
JUN	.150	.050		
HARDNESS (MG/L)			DET'N LIMIT = .500	GUIDELINE = 80-100 (A4)
JUN	283.000	293.000		
MAGNESIUM (MG/L)			DET'N LIMIT = .050	GUIDELINE = 30. (F2)
JUN	17.300	17.400		
SODIUM (MG/L)			DET'N LIMIT = .200	GUIDELINE = 200. (C3)
JUN	9.000	10.000		
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .05 (F2)
JUN	.012	.012		
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.000 (A1)
JUN	.014	.002	<T	
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020	GUIDELINE = 10.000 (A1)
JUN	2.170	2.260		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM
	RAW	TREATED		
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020	GUIDELINE = N/A
JUN	.600	.330		
PH (DMSNLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
JUN	8.490	7.960		
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = .5UG/L	GUIDELINE = N/A
JUN	.034	.001 <T		
PHOSPHORUS TTL-UNFIL (MG/L)			DET'N LIMIT = .002	GUIDELINE = .40 (F2)
JUN	.105	.002 <T		
RESIDUE (TOTAL) (MG/L)			DET'N LIMIT = 1.	GUIDELINE = 500. (A3)
JUN	363 CRO	395 CRO		
TURBIDITY (FTU)			DET'N LIMIT = .02	GUIDELINE = 1.00 (A1)
JUN	53.000	1.460		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
METALS				
ALUMINUM (MG/L)			DET'N LIMIT = .004	GUIDELINE = .10 (A4)
JUN	1.600	.022		
BARIUM (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1.000 (A1)
JUN	.050	.042		
BORON (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 5.000 (A1)
JUN	.020	.020		
CHROMIUM (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = .05 (A1)
JUN	.002	BDL		
COPPER (MG/L)			DET'N LIMIT = .001	GUIDELINE = 1.0 (A3)
JUN	.002	.002		
IRON (MG/L)			DET'N LIMIT = .002	GUIDELINE = .300 (A3)
JUN	2.500	.016		
MERCURY (UG/L)			DET'N LIMIT = 0.010	GUIDELINE = 1.000 (A1)
JUN	.090	.180		
MANGANESE (MG/L)			DET'N LIMIT = .001	GUIDELINE = .050 (A3)
JUN	.150	.023		
NICKEL (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = .05 (F3)
JUN	.003	BDL		
LEAD (MG/L)			DET'N LIMIT = 0.003	GUIDELINE = .050 (A1)
JUN	.013	BDL		
STRONTIUM (MG/L)			DET'N LIMIT = .001	GUIDELINE = 2.00 (H)
JUN	.180	.180		
URANIUM (UG/L)			DET'N LIMIT = .02	GUIDELINE = 20. (A2)
JUN	1.230	.120		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM
	RAW	TREATED		
VANADIUM (MG/L)			DET'N LIMIT = .001	GUIDELINE = .10 (H)
JUN	.005	.001		
ZINC (MG/L)			DET'N LIMIT = .001	GUIDELINE = 5.00 (A3)
JUN	.005	.001		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
SPECIFIC PESTICIDES			
ATRAZINE (NG/L)		DET'N LIMIT = 50.00	GUIDELINE = 60000. (B3)
JUN	1720.000	1700.000	
METOLACHLOR (NG/L)		DET'N LIMIT = 500.	GUIDELINE = 50000. (B3)
JUN	870.000 <T	1050.000 <T	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
PHENOLICS			
PHENOL (UG/L)		DET'N LIMIT = 0.2	GUIDELINE = 2.00 (A3)
JUN	.200 <T	.200 <T	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
VOLATILES			
P-XYLENE (UG/L)		DET'N LIMIT = 0	GUIDELINE = 620. (G)
JUN	BDL	.000 RMP	
M-XYLENE (UG/L)		DET'N LIMIT = 0	GUIDELINE = 620. (G)
JUN	BDL	.200 <T	
CHLOROFORM (UG/L)		DET'N LIMIT = 0	GUIDELINE = 350.0 (A1◇)
JUN	BDL	22.000	
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0	GUIDELINE = 350.0 (A1◇)
JUN	BDL	7.000	
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0	GUIDELINE = 350.0 (A1◇)
JUN	BDL	4.000	
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0	GUIDELINE = 350.0 (A1)
JUN	BDL	33.000	

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
CHEMISTRY (LAB)	CYANIDE	2	0.001	.200 (A1)	MG/L
METALS	ARSENIC	2	0.001	.050 (A1)	MG/L
	BERYLLIUM	2	0.001	.0002 (M)	MG/L
	CADMIUM	2	0.300	5.000 (A1)	UG/L
	COBALT	2	0.001	1.0 (M)	MG/L
	MOLYBDENUM	2	0.001	.50 (M)	MG/L
	SELENIUM	2	0.001	.010 (A1)	MG/L
CHLOROAROMATICS	HEXACHLOROBUTADIENE	2	1.000	450. (D4)	NG/L
	123 TRICHLOROBENZENE	2	5.000	10000. (I)	NG/L
	1234 T-CHLOROBENZENE	2	1.000	10000. (I)	NG/L
	1235 T-CHLOROBENZENE	2	1.000	10000. (I)	NG/L
	124 TRICHLOROBENZENE	2	5.000	10000. (I)	NG/L
	1245 T-CHLOROBENZENE	2	1.000	38000. (D4)	NG/L
	135 TRICHLOROBENZENE	2	5.000	10000. (D4)	NG/L
	HEXACHLOROETHANE	2	1.000	1900. (D4)	NG/L
	OCTACHLOROSTYRENE	2	1.000	N/A	NG/L
	PENTACHLOROBENZENE	2	1.000	74000. (D4)	NG/L
	236 TRICHLOROTOLUENE	2	5.000	N/A	NG/L
	245 TRICHLOROTOLUENE	2	5.000	N/A	NG/L
	26A TRICHLOROTOLUENE	2	5.000	N/A	NG/L
CHLOROPHENOLS	234 TRICHLOROPHENOL	2	50.	N/A	NG/L
	2345 T-CHLOROPHENOL	2	50.	N/A	NG/L
	2356 T-CHLOROPHENOL	2	50.	N/A	NG/L
	245-TRICHLOROPHENOL	2	50.	2600000(D4)	NG/L
	246-TRICHLOROPHENOL	2	50.	10000. (C1)	NG/L
	PENTACHLOROPHENOL	2	50.	10000. (C1)	NG/L
PESTICIDES & PCB	ALDRIN	2	1.000	700.0 (A1)	NG/L
	ALPHA BHC	2	1.000	700. (G)	NG/L
	BETA BHC	2	1.000	300. (G)	NG/L
	LINDANE	2	1.000	4000.0 (A1)	NG/L
	ALPHA CHLORDANE	2	2.000	7000.0 (A1)	NG/L
	GAMMA CHLORDANE	2	2.000	7000.0 (A1)	NG/L
	DIELDRIN	2	2.000	700.0 (A1)	NG/L
	METHOXYCHLOR	2	5.000	100000.(A1)	NG/L
	THIODAN I	2	2.000	74000. (D4)	NG/L
	THIODAN II	2	4.000	74000. (D4)	NG/L
	ENDRIN	2	4.000	200.0 (A1)	NG/L
	THIODAN SULPHATE	2	4.000	N/A	NG/L
	HEPTACHLOR EPOXIDE	2	1.000	3000.0 (A1)	NG/L
	HEPTACHLOR	2	1.000	3000.0 (A1)	NG/L
	MIREX	2	5.000	N/A	NG/L
	OXYCHLORDANE	2	2.000	N/A	NG/L
	OPDDT	2	5.000	30000. (A1)	NG/L
	PCB	2	20.000	3000. (A2)	NG/L
	PP-DDD	2	5.000	N/A	NG/L
	PPDDE	2	1.000	30000. (A1)	NG/L
	PPDDT	2	5.000	30000. (A1)	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
PESTICIDES & PCB	ATRATONE	2	50.	N/A	NG/L
	ALACHLOR	2	500.	35000. (D2)	NG/L
	ETHYLENE DIBROMIDE	2	0	50.0 (G)	UG/L
	HCB	2	1.000	10.0 (C1)	NG/L
SPECIFIC PESTICIDES	TOXAPHENE	2	N/A	5000. (A1)	NG/L
	AMETRYNE	2	50.00	300000.(D3)	NG/L
	BLADEX	2	100.00	10000. (B3)	NG/L
	PROMETONE	2	50.00	52500. (D3)	NG/L
	PROPAZINE	2	50.00	16000. (D2)	NG/L
	PROMETRYNE	2	50.00	1000. (B3)	NG/L
	SENCOR	2	100.00	80000. (B2)	NG/L
	SIMAZINE	2	50.00	10000. (B3)	NG/L
	2,4,5-T	2	50.00	35000. (D2)	NG/L
	2,4-D	2	100.00	100000.(A1)	NG/L
	24DCHLRPHENOXYBUTYRC	2	200.00	18000. (B3)	NG/L
	2,4-DP	2	100.00	N/A	NG/L
	DICAMBA	2	100.00	87000. (B3)	NG/L
	PICHLORAM	2	100.00	2450000(D3)	NG/L
	SILVEX	2	50.00	10000. (A1)	NG/L
	DIAZINON	2	20.	14000. (A1)	NG/L
	DICHLORVOS	2	20.	N/A	NG/L
	DURSBAN	2	20.	N/A	NG/L
	ETHION	2	20.	35000. (G)	NG/L
	GUTHION	2	N/A	N/A	NG/L
	MALATHION	2	20.	160000. (G)	NG/L
	MEVINPHOS	2	20.	N/A	NG/L
	METHYL PARATHION	2	50.	7000. (B3)	NG/L
	METHYLTRITHION	2	20.	N/A	NG/L
	PARATHION	2	20.	35000. (B1)	NG/L
	PHORATE	2	20.	35.0 (D2)	NG/L
	RELDAN	2	20.	N/A	NG/L
	RONNEL	2	20.	N/A	NG/L
	AMINOCARB	2	N/A	N/A	NG/L
	BENOMYL	2	N/A	N/A	NG/L
	BUX	2	2000.	N/A	NG/L
	CARBOFURAN	2	2000.	18000. (D3)	NG/L
	CIPC	2	2000.	350000. (G)	NG/L
	DIALLATE	2	2000.	30000. (H)	NG/L
	EPTAM	2	2000.	N/A	NG/L
	IPC	2	2000.	N/A	NG/L
	PROPOXUR	2	2000.	90000. (G)	NG/L
	SEVIN	2	200.	70000. (A1)	NG/L
	SUTAN	2	2000.	245000.(D3)	NG/L
VOLATILES	BENZENE	2	0	5.0 (D1)	UG/L
	TOLUENE	2	0	100.0 (G)	UG/L
	ETHYLBENZENE	2	0	3400. (D3)	UG/L
	O-XYLENE	2	0	620. (G)	UG/L
	1,1 DICHLOROETHYLENE	2	0	7.0 (D1)	UG/L
	DICHLOROMETHANE	2	0	1750. (D3)	UG/L
	T1,2DICHLOROETHYLENE	2	0	350. (D3)	UG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ALVINSTON WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
VOLATILES	1,1 DICHLOROETHANE	2	0	N/A	UG/L
	111, TRICHLOROETHANE	2	0	200. (D1)	UG/L
	1,2 DICHLOROETHANE	2	0	5.0 (D1)	UG/L
	CARBON TETRACHLORIDE	2	0	5.0 (D1)	UG/L
	1,2 DICHLOROPROPANE	2	0	10.0 (G)	UG/L
	TRICHLOROETHYLENE	2	0	5.0 (D1)	UG/L
	112 TRICHLOROETHANE	2	0	.60 (D4)	UG/L
	T-CHLOROETHYLENE	2	0	10.0 (C2)	UG/L
	BROMOFORM	2	0	350.0 (A1+)	UG/L
	1122 T-CHLOROETHANE	2	0	0.17 (D4)	UG/L
	CHLOROBENZENE	2	0	1510. (D3)	UG/L
	1,4 DICHLOROBENZENE	2	0	75.0 (D1)	UG/L
	1,3 DICHLOROBENZENE	2	0	130. (G)	UG/L
	1,2 DICHLOROBENZENE	2	0	130. (G)	UG/L
	TRIFLUOROCHLOROTOLUE	2	0	N/A	UG/L

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and

missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free,combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

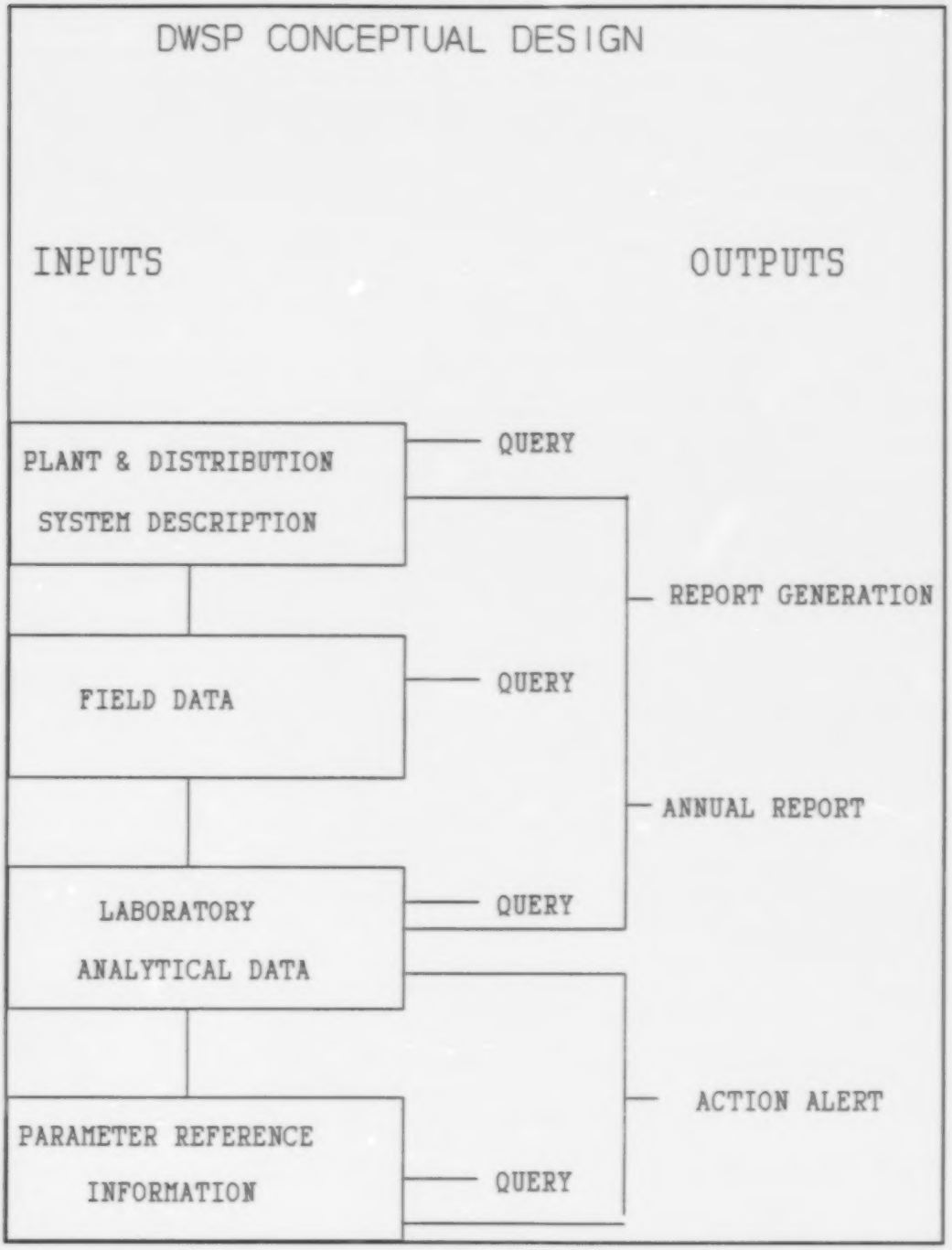
DWSP CONCEPTUAL DESIGN
INPUTS
OUTPUTS
PLANT & DISTRIBUTION SYSTEM DESCRIPTION
FIELD DATA
LABORATORY ANALYTICAL DATA
PARAMETER REFERENCE INFORMATION
QUERY
QUERY
QUERY
QUERY
REPORT GENERATION
ANNUAL REPORT
ACTION ALERT

FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P) PARAMETER
REFERENCE
BENZENE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA	C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA	C 80/11		NOMETH	6.60	063000 UG/L	
FERC	C 84/05		NOMETH	1.00	063000 UG/L	
WHO	C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE
CAS#: 71432
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L
SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27), CYCLOHEXATRIENE (41)
CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:
SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)
THRESHOLD ODOUR: NO DATA
THRESHOLD TASTE: 0.5 MG/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMUALTE IN LIVING ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL QUANITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL TAR DISTILLATION, FOOD PROCESSING, TANNING.
USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY, DEGREASING AND CLEANSING AGENT, GASOLINE.
TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES MUCOUS MEMBRANES, SYMPTONS INCLUDE RESTLESSNESS, CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE; CHRONIC - ANEMIA AND LEUKEMIA (45).
CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN
REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM FOLLOWED BY SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).
MOLECULAR WEIGHT: 78.12 GRAMS
MELTING POINT: 5.5 DEGREES C (27)
BOILING POINT: 80.1 DEGREES C (27)
SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)
VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C
HENRY'S LAW CONSTANT: 0.00555 ATM M^3/MOLE
LOG OCT./WATER PAR.COEFF: K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC),(OWTRI),(OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)

Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and $KCrO_7$ corrosive)
Phenols	-250 mL clear glass bottle -do <u>not</u> rinse bottle -fill to top of label as marked

<u>Steps</u>

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear palstic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC),(OWTRI)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and KCrO7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), tubidity and pH on submission sheet.